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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/829,876	04/10/2001	Shuichi Kikuchi	10417-076001	7681

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EXAMINER
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OWENS, DOUGLAS W

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 03/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/829,876

Applicant(s)

KIKUCHI ET AL.

Examiner

Douglas W Owens

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 04 December 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 1-4 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 5-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 04 December 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### *Drawings*

1. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on December 4, 2002 have been approved. A proper drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The correction to the drawings will not be held in abeyance.

2. The Patent and Trademark Office no longer makes drawing changes. See 1017 O.G. 4. It is applicant's responsibility to ensure that the drawings are corrected.

Corrections must be made in accordance with the instructions below.

### INFORMATION ON HOW TO EFFECT DRAWING CHANGES

#### 1. **Correction of Informalities -- 37 CFR 1.85**

New corrected drawings must be filed with the changes incorporated therein. Identifying indicia, if provided, should include the title of the invention, inventor's name, and application number, or docket number (if any) if an application number has not been assigned to the application. If this information is provided, it must be placed on the front of each sheet and centered within the top margin. If corrected drawings are required in a Notice of Allowability (PTOL-37), the new drawings **MUST** be filed within the **THREE MONTH** shortened statutory period set for reply in the "Notice of Allowability." Extensions of time may NOT be obtained under the provisions of 37 CFR 1.136 for filing the corrected drawings after the mailing of a Notice of Allowability. The drawings should be filed as a separate paper with a transmittal letter addressed to the Official Draftsperson.

#### 2. **Corrections other than Informalities Noted by Draftsperson on form PTO-948.**

All changes to the drawings, other than informalities noted by the Draftsperson, **MUST** be made in the same manner as above except that, normally, a highlighted (preferably red ink) sketch of the changes to be incorporated into the new drawings **MUST** be approved by the examiner before the application will be allowed. No changes will be permitted to be made, other than correction of informalities, unless the examiner has approved the proposed changes.

### **Timing of Corrections**

Applicant is required to submit acceptable corrected drawings within the time period set in the Office action. See 37 CFR 1.185(a). Failure to take corrective action within the set (or extended) period will result in **ABANDONMENT** of the application.

### ***Specification***

3. The disclosure is objected to because of the following informalities: The specification is replete with the terms such as, "reverse conductive type impurity", "first concentration reverse conductive type", "reverse conductive type source", "one conductive type" and similar terms. "Concentration reverse conductive type", "reverse conductive type" and similar terms are not art recognized language.

In line 5 of page 6, "concentrate" should be replaced with "concentration".

The word "volume" should be replaced with "dose" in the following places, for example, since a volume cannot be described in terms of cm<sup>2</sup>: Page 12, line 21; page 13, line 23; page 15, line 8; page 16, line 16.

The phrase "gate electrode 7" should be replaced with "first gate insulation 4" in the following places, for example (See Fig. 10, with respect to distance "L"): Page 17, lines 18 and 25; page 18, line 6; page 19, line 1; page 20, lines 1, 9, 15 and 20.

Appropriate correction is required.

### ***Claim Objections***

4. Claims 8 – 18 and 20 are objected to because of the following informalities:

Claim 9 recites the limitation, "...wherein phosphorus ion is implanted..." The word "ion" should be deleted or "ion is" should be replaced with "ions are". Claim 10 recites the same limitation.

Claim 8 recites the limitation, "...the high impurity concentration being low at a region near surface of the substrate...". The high impurity concentration region cannot also be a low impurity concentration region. Is it the applicant's intention to claim a high impurity concentration region with a low impurity concentration region adjacent the high impurity concentration region, wherein the low impurity concentration region is closer in proximity to the upper surface of the substrate? Alternatively, is it the Applicant's intention to claim a region with a graded impurity concentration that decreases toward an upper surface of the substrate?

Claims 10, 12, 14, 16, 18 and 20 are objected to since they depend from objected base claim 8 and accordingly include all limitations thereof.

Claim 11 recites the limitation, "...ion implantation is carried out at a region...". The word "at" should be replaced with "in". Claims 12 – 14 recite similar limitations.

Claim 15 recites the limitation, "...wherein said layer is formed at a region...". The word "at" should be replaced with "in". Claims 16 – 18 recites similar limitations.

Claim 13 recites the limitation "...using a side wall insulation film formed at a side wall portion...". The word "at" should be replaced with "adjacent" or a similar term that describes the position of the side wall insulation film.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 6-20 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 6 requires that the impurities used to form the first and second drain regions be diffused from the first gate insulation film. The disclosure only provides for implanting impurities into the substrate and diffusing them by performing a thermal treatment. There is no disclosure of providing impurities in a gate insulation film and diffusing them to the substrate. *OK*

Claim 7 requires that the layer of the first conductivity type span from one end of the gate insulation film to the third drain region. The impurity layer (11A, B, C) extends beyond the third drain region (10) as opposed to only extending to the third drain. Additionally, the impurity layer does not span from one end of the first gate insulation film. The impurity layer spans from a predetermined distance (L) away from an end of the first gate insulation film. *OK*

Claims 9, 11, 13, 15, 17 and 19 are rejected as depending from rejected base claim 7.

Claim 8 requires that a high concentration be formed, wherein the high impurity concentration layer (11A, 11B, 11C) spans from one end of the first gate insulation (4) to the third drain region (10) and the high impurity concentration region is low near a surface of the substrate. There is no support for these limitations in the disclosure. The region 11A, 11B and 11C is described as having a "middle concentration" (page 16, line

25; page 18, line 23). Additionally, the impurity layer (11A, B, C) extends beyond the third drain region (10) as opposed to only extending to the third drain. There is also no mention in the disclosure of the impurity layer 11 having a graded concentration or a layer above it having a lower impurity concentration. Furthermore, the impurity layer does not span from one end of the first gate insulation film. The impurity layer spans from a predetermined distance (L) away from an end of the first gate insulation film.

Claims 10, 12, 14, 16, 18 and 20 are rejected as being dependent from rejected base claim 8.

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 5 – 7 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by US patent No. 5,578,514 to Kwon et al.

Regarding claim 5, Kwon et al. teaches a method of making a semiconductor device comprising the steps of:

implanting an impurity of a first type (23) in a semiconductor substrate (12) of a second type;

providing a first gate insulation film (26);

diffusing the implanted impurity (Col. 2, line 65 – Col. 3, line 9);

providing a second gate insulation film (30) on the substrate in a different location than the first gate insulation film;

providing a gate electrode (32) that spans from the first gate insulation film to the second gate insulation film;

providing a source region (34) of the first conductivity type; and

providing a third drain region (36) of the first conductivity type.

Kwon et al. does not explicitly teach that the impurity region is diffused such that a first drain region is formed, with a second drain region having a different concentration than the first drain region and further, where the second drain region is above the first drain region. Kwon et al. teaches performing a thermal step for the purpose of diffusion drive in after the implantation step. Kwon et al. discloses that the diffusion drive in step is performed at approximately 1100° C for approximately 120 – 240 minutes (Col. 3, lines 6 – 10). The Applicant discloses that diffusing a first implant forms the first and second drain regions. The method taught by Kwon et al. would have inherently resulted in a device having first and second drain regions as claimed in the instant application since the steps performed subsequent to the implant are nearly identical.

Regarding claim 6, Kwon et al. does not explicitly teach that providing the first and second drain comprises diffusing impurities from the first gate insulating film. The method taught by Kwon et al. would have inherently resulted in impurities being diffused from the first gate insulating film since the method is nearly identical to that of the claimed invention.

Regarding claim 7, Kwon et al. teaches a method further comprising:



providing a layer of the first conductive type (14) to span from one end of the first gate insulation film to the third drain region.

Regarding claim 19, Kwon et al. does not explicitly teach a first drain region that has a lower impurity concentration than the second drain region. The method taught by Kwon et al. would have inherently resulted in a first drain region with a lower impurity concentration than the second drain region since the method is the nearly identical to that of the claimed invention.

### ***Response to Arguments***

9. Applicant's arguments filed December 4, 2002 have been fully considered but they are not persuasive.

The Applicant argues that Kwon et al. does not show drain regions with different impurity concentrations. Kwon et al. teaches performing an implant (23) and then diffusing the implant via a thermal process to complete formation of the drain region (24), which is the same method disclosed in the instant application to form two drain regions having different concentrations. It is seen as being inherent that the method taught by Kwon et al. would have produced two drain regions having different concentrations since the method is nearly identical to that of the claimed invention. Kwon et al. further teaches forming a third drain region (36) in a separate implantation step.

The applicant argues that Kwon et al. only discloses one drain region (36). One having ordinary skill in the art could reasonably see that the drift region (24) performs the function of a drain, since it is disposed at the end of a channel that is opposite the

source region (34). As discussed above, drain region 24 would have inherently comprised two drain regions. The additional drain region 36 makes a total of three drain regions.

### ***Conclusion***

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas W Owens whose telephone number is 703-308-6167. The examiner can normally be reached on Monday-Friday.

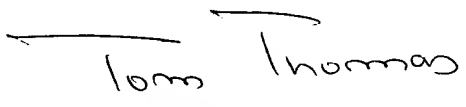
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for

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the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

DWO  
March 3, 2003

  
TOM THOMAS  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2000